

## LTC5577 300MHz to 6GHz High Signal Level Active Downconverting Mixer

### DESCRIPTION

Demonstration circuit DC2070A is optimized for evaluation of the [LTC®5577](#) high signal level active downconverting mixer. Its RF input port is matched to  $50\Omega$  from 1.3GHz to 4.3GHz with 12dB return loss, and the LO port is matched to  $50\Omega$  from 930MHz to 4.1GHz with 10dB return loss. The RF and LO inputs are easily matched for higher or lower frequencies with simple external matching, as low as 350MHz and 300MHz, respectively. The low capacitance differential IF output is usable up to 1.5GHz. The LTC5577 active mixer is optimized for RF downconverting applications that require high input signal handling capability and wide bandwidth.

Design files for this circuit board are available at <http://www.linear.com/demo>

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### ABSOLUTE MAXIMUM INPUT RATINGS

Supply Voltage ( $V_{CC}$ , $IF^+$ , $IF^-$ )	4V
Enable Input Voltage (EN)	-0.3V to $V_{CC} + 0.3V$
LO Input Power (300MHz to 6GHz)	10dBm
LO Input DC Voltage	$\pm 0.1V$
RF Input Power (300MHz to 6GHz)	18dBm
RF Input DC Voltage	$\pm 0.1V$
TEMP Monitor Input Current	10mA
Operating Temperature Range ( $T_C$ )	-40°C to 105°C
Junction Temperature ( $T_J$ )	150°C
Storage Temperature Range	-65°C to 150°C

**CAUTION: THIS PART IS SENSITIVE TO ELECTRO-STATIC DISCHARGE (ESD). OBSERVE PROPER ESD PRECAUTIONS WHEN HANDLING THE LTC5577.**

### BOARD PHOTO

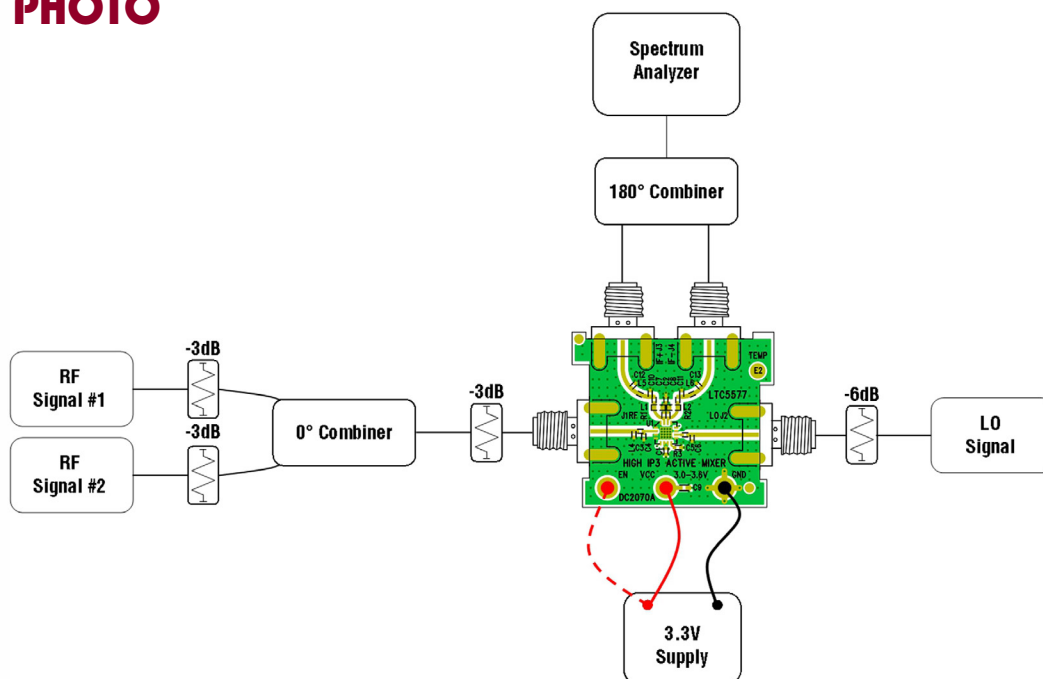


Figure 1. Test Setup for Mixer 2-Tone Measurements

## NOTES ON TEST EQUIPMENT AND SETUP

- High performance signal generators with low harmonic outputs should be used for 2-tone measurements. Otherwise, low pass filters at the signal generator outputs should be used to suppress harmonics.
- High quality combiners should be used to present a broadband 50 $\Omega$  termination on all ports as well as provide good port-to-port isolation. Attenuator pads should be used on the inputs to the combiner and the RF input port of the LTC5577 mixer, as shown in Figure 1. Adding attenuator pads further improves source isolation and helps prevent the signal generators from producing intermodulation products.
- Spectrum analyzers can produce significant internal distortion products if they are overdriven. Generally, spectrum analyzers are designed to operate at their best with about –30dBm to –40dBm at their input. The spectrum analyzer's input attenuation setting should be used to avoid saturating the instrument. Set the spectrum analyzer's input attenuation depending on the spectrum analyzer used.
- Before performing measurements on the DUT, the system performance should be evaluated to ensure that a clean input signal is obtained and that the spectrum analyzer's internal distortion is minimized

## PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	4	C1, C2, C7, C8	CAP, 1nF, 10%, 16V, X7R, 0402	MURATA, GRM155R71C102KA01D
2	1	C3	CAP, 8.2pF, $\pm 0.1$ pF, 50V, NPO, 0402	MURATA, GJM1555C1H8R2CA01D
3	1	C4	CAP, 0.7pF, $\pm 0.1$ pF, 50V, NPO, 0402	MURATA, GJM1555C1HR70BB01D
4	1	C5	CAP, 3.9pF, $\pm 0.1$ pF, 50V, NPO, 0402	MURATA, GJM1555C1H3R9BB01D
5	0	R3, L4, L5, L6, C6, C10, C11, C12, C13	COMP, 0402, OPT	0402
6	1	C9	CAP, 1 $\mu$ F, 10%, 10V, X7R, 0603	MURATA, GRM188R61A105KA61D
7	3	E1, E3, E4	TURRET, PAD, 0.094"	MILL-MAX, 2501-2-00-80-00-00-07-0
8	1	E2	TURRET, PAD, 0.061"	MILL-MAX, 2308-2-00-80-00-00-07-0
9	4	J1-J4	CONN, SMA, 50 $\Omega$ , EDGE-LAUNCH	E.F. JOHNSON, 142-0701-851
10	2	L1, L2	IND, 560nH, 2%, 0603	COILCRAFT, 0603LS-561XGL
11	2	R1, R2	RES, CHIP, 115, 1%, 0402	VISHAY, CRCW0402115RFKED
12	1	U1	IC, LINEAR TECHNOLOGY, LTC5577IUF, QFN16, 4x4	LINEAR TECHNOLOGY, LTC5577IUF

## QUICK START PROCEDURE

1. Set the power supply output voltage to 3.3V and the current limit to 250mA. Turn off the power supply output.
2. Connect all test equipment and the power supply as shown in Figure 1.
3. Ramp on the power supply with a minimum ramp time of 1ms.
4. Set the LO signal generator to provide an 1800MHz CW signal at about 0dBm at the DC2070A's LO port.

## QUICK START PROCEDURE

5. Set the two RF signal generators to provide one 1949MHz CW signal and one 1951MHz CW signal. The signals should be applied to the 0° combiner. The power applied to the DC2070A's RF input port should be about -3dBm/tone.
6. Perform various measurements (conversion gain, IP3, LO leakage, etc.).
7. To turn off the DC2070A, either turn off the power supply's output, or remove the power leads starting with the EN lead.

## SCHEMATIC DIAGRAM

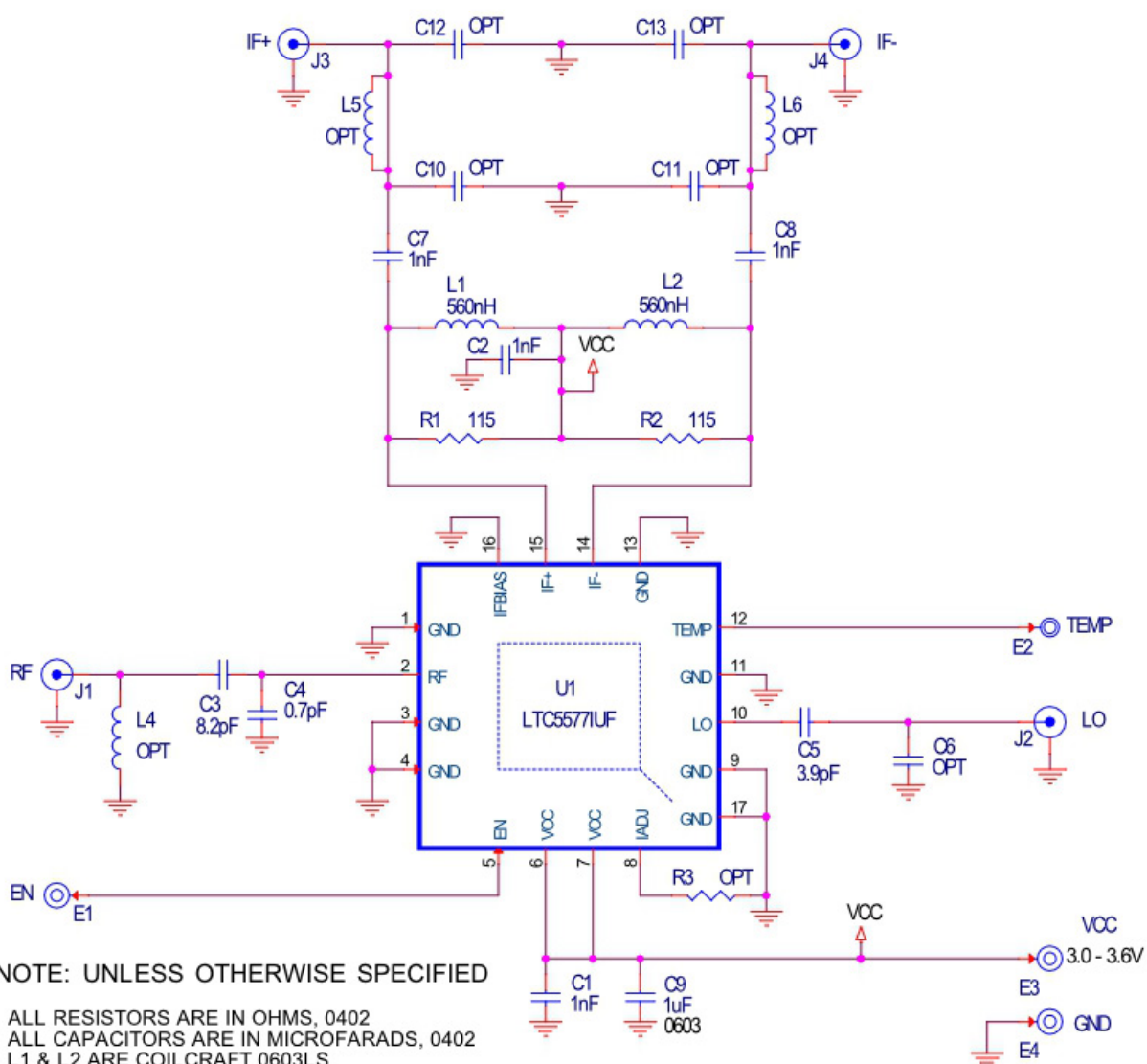


Figure 2. High Signal Level Active Mixer

# DEMO MANUAL DC2070A

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**Please read the DEMO BOARD manual prior to handling the product.** Persons handling this product must have electronics training and observe good laboratory practice standards. **Common sense is encouraged.**

This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact a LTC application engineer.

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